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FITNESS

Preservice Physical Education Teacher Attitudes Toward Fitness Tests and the Factors Influencing Their Attitudes

Rachyl Stephenson, Xiaofen Hamilton, Xiaolu Liu, Michael Hodges, Jeffrey Colburn, Robert Knipe

Abstract

This study aimed to investigate preservice physical education teachers' (PPETs') attitudes toward fitness testing, and factors that may influence such attitudes. One hundred fifty-seven PPETs participated in the study (54.1% male). A slightly modified quantitative survey on PPETs' attitudes toward fitness testing validated by Keating et al. (2001) was utilized. Analysis of variance and multivariate analysis of variance were used in data analysis. Consistent with Keating el al. (2001), the results indicated that PPETs had moderate, but significant, positive attitudes toward fitness testing. PPETs' previous experiences with fitness tests affected their attitudes. Findings also showed PPETs' professional memberships had a significant effect, but only on their beliefs of importance and usefulness of fitness testing. The data concluded that PPETs' overall attitudes toward fitness testing were similar to the data found over 20 years ago. These results hold implications for PETE programming in that PETE faculty need to aid in PPETs' journeys in fostering positive attitudes toward fitness testing to increase their

Rachyl Stephenson, Department of Exercise and Sport Science, University of Wisconsin-La Crosse. Xiaofen Hamilton, Department of Curriculum & Instruction, The University of Texas Austin. Xiaolu Liu, Department of Kinesiology and Health, Georgia State University. Michael Hodges, Department of Health, Physical Education, & Recreation, Bronx Community College. Jeffrey Colburn, Department of Curriculum & Instruction, The University of Texas Austin. Robert Knipe, College of Health and Movement Sciences, Southern Connecticut State University. Please send author correspondence to rstephenson@uwlax.edu

confidence in administering testing within physical education and to integrate fitness testing in sound fitness education.

Fitness Education and Physical Fitness Benefits

Students within the K–12 system develop their health-related fitness (HRF) knowledge and skills and value healthy living if engaged in a quality physical education program (Bailey, 2006; Bailey et al., 2009). The Society of Health and Physical Educators (SHAPE America), the United States' national health and physical education association, describes individuals who experience quality physical education as physically literate individuals. Therefore, the successful implementation of a quality physical education program within the K–12 system can significantly influence public health (Mckenzie & Lounsbery, 2014; Keating et al., 2001) because these programs create and support the potential of physical literacy. In fact, research has claimed physical education to be the most cost-effective method for combating childhood obesity (Döring et al., 2016). Because almost every child is mandated to attend school (some students are homeschooled), this provides the school system the opportunity to combat physical inactivity, which is associated with numerous preventable diseases (Lee et al., 2012).

In fact, a strong body of literature has documented a positive relationship between health-related fitness (HRF) and academic achievement (Fedewa & Ahn, 2011; Lorenz et al., 2017; Mcloughlin et al., 2020). This link between HRF and academic achievement is a worldwide phenomenon. For example, Telford et al. (2012) conducted a study in Australia and discovered physically fit students achieved higher academic scores. Another study, in the United States, found that fit elementary students held overall higher grades than those who were not fit (Lorenz et al., 2017). From a collective research perspective, Fedewa and Ahn (2011) completed a meta-analysis exploring the effects of physical activity and HRF on children's cognitive outcomes, finding significant and positive correlated effects. They noted that aerobic exercise had the greatest effect. Findings from McLoughlin et al. (2020) suggested that moderate improvements in weight and aerobic capacity had a positive association with academic achievement. Physical education is a prime space to make the connection between physical fitness and academic achievement

through fitness testing if the curriculum incorporates fitness education and, within that, allows students to gain an awareness of the benefits of physical fitness.

Assessment of Physical Fitness

In the literature, the most common method to assess physical fitness is the Cooper Institute–created Fitnessgram, a fitness test that examines all five HRF components through a series of test batteries (Dauenhauer et al., 2019; Keating et al., 2018; Morrow et al., 2009). Proper methods for implementing Fitnessgram have been put forth by SHAPE America (2017), which describes the test as a mode to teach fitness concepts and skills and to build awareness of HRF. Unfortunately, research has claimed physical education teachers routinely use Fitnessgram inappropriately (Keating & Silverman, 2004) and many students dislike HRF activities due to the inappropriate use of the test (Silverman et al., 2008). A potential way to rectify poor implementation of Fitnessgram is the proper preparation of preservice physical education teachers (PPETs) during their physical education teacher education (PETE) program on the instructional practices for best fitness-testing practices (Mercier et al., 2016; Silverman et al., 2008).

Beliefs and Attitudes Toward Fitness Testing

Physical education teachers typically have the autonomy to incorporate HRF concepts (including fitness education), fitness testing, and even test batteries in their K–12 classes in the United States (Dauenhauer et al., 2019; Keating et al., 2001). Because of the autonomy given to physical education teachers on these topics and implementation within their teaching practices, it then becomes important to understand PPETs' attitudes toward fitness testing. Depending on the state and district, the choice to include specific aspects of fitness education and physical fitness testing differs. Bulger et al. (2000) suggested that PETE faculty should create, implement, and find alternative strategies to improve PPETs' fitness and understanding of fitness education content, as well as for PPETs' future students. One alternative strategy for PETE faculty could be investigating the role of PPETs' attitudes toward fitness testing. Attitudes can be a vital predictor of actual teacher practices (Pajares, 1992), and these attitudes—in this case, attitudes toward fitness testing—

may contribute to the preparedness of physical education teachers to utilize fitness tests (Keating, Liu, et al., 2020; Mercier et al., 2016). If these attitudes toward fitness tests are positive, there may be potential for an increase in PPETs' confidence and comfortability in teaching fitness education and administering fitness tests (Keating et al., 2002). Research has indicated that attitudes can be altered through intervention (Theodorakis, 1992). PETE programming and curriculum has the potential to serve as an intervention to altering PPETs' dispositions toward fitness testing, with the intent of PPETs fostering positive attitudes toward fitness testing. Therefore, considering PPETs' attitudes toward fitness education and fitness testing during their PETE programming can expose how they will incorporate fitness tests in their future instructional practices (Keating et al., 2002).

The literature on PPETs' attitudes and beliefs with regard to fitness testing is sparse. However, it has been documented that students from all levels of K–12 education communicated their main reason for having a negative attitudes toward physical education was participating in HRF testing (Millslagle & Keyes, 2000). Interestingly, Petersen et al. (2003) found PPETs intensely believed in the importance of fitness. Keating et al. (2002) discovered that PPETs increased their negative attitudes toward fitness testing the longer they were in the PETE program. Keating et al. (2002) called into question why positive attitudes toward fitness testing are not fostered during the PETE process. They suggested PETE programs may not have placed any emphasis on attitudes toward fitness testing, or they may have attempted to make changes, but these changes may not have had a significant impact. In the results within the study by Keating et al. (2002), variables such as PETE program type, membership in a professional organization, age, and gender did not influence PPETs' attitudes toward fitness testing. Interestingly, and most critically, past experiences with fitness testing did influence PPETs' attitudes toward fitness testing. On the contrary, a quantitative study by Keating, Liu, et al. (2020) found that Chinese PPETs reported slightly positive attitudes toward fitness testing and male students held significantly more positive attitudes toward fitness testing than did their female counterparts.

Issues With the Preparation of Fitness Test Use in Physical Education Teacher Education Programming

Scholars have claimed PETE programs do a poor job preparing PPETs for HRF testing practices (Keating et al., 2002). Due to this, PPETs are less likely to implement HRF education, including fitness activities and knowledge in their instructional practices, into their programs (Whitley et al.,1994). McKenzie and Sallis (1996) indicated that PETE programs do not sufficiently prepare PPETs to use fitness testing to advocate for students' regular participation in physical activity. These concerns are likely a result of PETE programming, instruction, and limited curricular space allocated to fitness education, routinely described in research (Ayers & Housner, 2008; Phelps & Keating, 2020). Petersen et al. (2003) stated that "despite the fact that physical activity and fitness should occupy an important place in K–12 physical education programs, there is some controversy over what [physical education teachers] and PE majors should actually be expected to do in relation to fitness" (p. 6). Part of the disconnect in understanding could be due to PPETs experiencing challenges in making meaningful connections between the theories present in PETE coursework and the real-life application of the content as a prospective physical education teacher (Bulger et al., 2000). While PPETs gain new knowledge through teacher preparation, when these understandings are not congruent with actual practices within PPETs' field experiences, the knowledge imparted on PPETs has little effect because of prior beliefs that have accumulated over a lifetime from their own K–12 learning experiences (Lawson, 1983).

In response to incongruency between preparation programs and field placements, recommendations have been made for PETE programs to weave HRF knowledge into programming and field experiences to minimize the theorized gap between "theory and practice" (Bulger et al., 2000). These suggestions included teaching fitness education that provides PPETs the knowledge and foundation to increase field experiences that offer opportunities in school settings regarding HRF (Bulger et al., 2000; Miller & Housner, 1998). It is important to recognize that PETE faculty can indirectly impact student physical activity, and HRF learning and promotion by preparing successful PPETs (Bulger et al., 2000). A majority of PETE professionals would come to the consensus that it is essential

to ensure PPETs possess the adequate HRF knowledge to satisfy their job responsibilities to teach HRF knowledge to their students (Keating et al., 2009). Although Lund (1992) found PETE programs to offer evaluation and measurement techniques, she criticized the lack of valid and reliable systematic assessment instruments offered. As such, studies have found it vital to prepare PPETs on the use and application of valid and reliable assessments, such as youth fitness tests, throughout their experiences (Martin et al., 2010). Unfortunately, the use of valid and reliable assessment has yet to transpire in the field (Keating & Silverman, 2009).

Given the complexity of influences and experiences impacting PPETs' fitness knowledge, Keating et al. (2009) described that the limited HRF knowledge of K–12 students should not be a surprising phenomenon. In fact, Petersen et al. (2003) shared that PPETs, as well as some beginning physical education teachers, require a significant level of knowledge, almost to the masterly level, to transform that subject matter for students to understand. Generally, when PPETs lack the knowledge necessary to be successful in impacting student change, this might lead to negative attitudes toward fitness testing, possibly because of unconfident mindsets in their abilities as educators. With this in mind, the affective component (attitudes and beliefs) may hold a significantly higher role in changing students' perceptions of fitness testing than previously known (Keating et al., 2002).

Training to accurately administer fitness testing needs to be successfully implemented to support PPETs' use of fitness testing (Keating et al., 2001). Even though pleas for further inquiry on the use of fitness tests in school have been within the literature for both practitioners and researchers since the 1980s (Fox & Biddle, 1988), a lack of research signifies the extent to which novice teachers understand the concepts they are held responsible to teach (Petersen et al., 2003). Miller and Housner (1998) called for further investigation of the HRF knowledge of PPETs and exploration of what is pedagogically relevant for prospective physical education teachers, which has yet to commence. It is also still unknown whether PETE programs provide sufficient attention to PPETs' feelings and psychological preparation regarding the use of fitness tests (Keating et al., 2002). In response to these calls for greater understanding of PPETs' attitudes

toward fitness testing, this study aimed to explore PPETs' attitudes toward fitness testing. These findings may indicate a change in PPETs' attitudes with regard to youth fitness testing, or lack thereof, in comparison to Keating et al.'s (2002) findings. The purpose of this study was to utilize the findings to inform decisions for PETE programming and PPETs' professional development and support.

Method

Participants

Initially, one hundred ninety-eight PPETs from the United States took a quantitative survey validated by Keating et al. (2002). After data screening, which aims to eliminate cases with more than 50% missing values, 157 responses were included for data analysis. The average age of the participants was 22.63 ± 7.04. Participants were grouped by gender, ethnicity, year in university, previous experience with fitness tests, and professional membership (Table 1). The gender distribution was about even with 54.1% male participants. The majority of the participants identified as White (77.1%). The participants identified their year in school as freshman (7.6%), sophomore (23.6%), junior (26.8%), and senior (21.7%). Of the participants, 22.9% had neither enjoyable nor unenjoyable experience with fitness tests, while 38.2% had at least somewhat enjoyable experience with fitness tests. Moreover, 56.1% of the participants did not join in any professional association such as SHAPE America or the state physical education association.

Data Collection

Keating et al.'s (2001) instrument for measuring PPETs' attitudes toward fitness tests was used for data collection. The reliability and validity of surveys measuring attitudes have always been of concern (Mercier et al., 2016; Silverman, 2017). Therefore, it is deemed important to address the validated survey used in the measurement of PPETs' attitudes toward fitness testing (Keating, Liu, et al., 2020; Keating et al., 2002). On the basis of the two-component model of attitudes proposed by Silverman and Subramaniam (1999), Keating et al. (2001) developed a questionnaire measuring PPETs' attitudes toward fitness tests in schools. According to Keating et al. (2001), the instrument consisted of affect (i.e., enjoyment of using fitness

Table 1
Participant Demographics

Demographic	*N*	%
Gender		
Male	85	54.1
Female	65	41.4
Missing	7	4.5
Ethnicity		
White	121	77.1
Black	9	5.7
Asian/Pacific Islander	3	1.9
Hispanic/Latino	6	3.8
American Indian/Alaskan Native	1	0.6
Two or more races	4	2.5
Other	6	3.8
Missing	7	4.5
Year in university		
Freshman	12	7.6
Sophomore	37	23.6
Junior	42	26.8
Senior	34	21.7
Other	25	15.9
Missing	7	4.5
Previous experience with fitness tests		
Very unenjoyable	15	9.6
Unenjoyable	18	11.5
Somewhat unenjoyable	21	13.4
Neither enjoyable nor unenjoyable	36	22.9
Somewhat enjoyable	24	15.3
Enjoyable	25	15.9
Very enjoyable	11	7.0
Missing	7	4.5
Professional membership		
Yes	62	39.5
None	88	56.1
Missing	7	4.5

tests) and cognitive (i.e., importance of fitness tests and usefulness of using fitness test results) components. The instrument demonstrated acceptable reliability (i.e., all G-C alpha values were greater than .8) and validity (i.e., root-mean-square error of approximation < .08, goodness of fit > .98, adjusted goodness-of-fit index > .98, and root-mean-square residuals < .05; Meyers et al., 2017). Originally, two types of fitness testing batteries (i.e., The President's Challenge and Fitnessgram) were available in the United States. Since the Presidential Youth Fitness test has now adopted Fitnessgram, the first test battery is no longer being used. Therefore, the survey was modified to focus on Fitnessgram only.

Using Qualtrics, we created an electronic version of the survey. The updated format was designed to be mobile and computer compatible so that it was easier for participants to access and complete. A link was created through the Qualtrics software for distribution of the survey. We employed a convenience sample by contacting PETE program coordinators throughout the United States. The participants were asked if they would be willing to distribute the link to their PPETs throughout the year of 2019. Due to the anonymity of the identity questions on the survey, there was no way to track which universities responded. Analysis from the Qualtrics software revealed it took a majority of the participants only 4 min to complete the survey. All questions within the domains of the survey were on a 7-point Likert scale, which is the same as the original survey used in prior studies (Keating et al., 2001, 2002).

Data Analysis

SPSS 26.0 was used in data analysis. Descriptive statistics including means and standard deviations for all the attitude variables were calculated (e.g., overall attitude, three subdomains of attitudes: affects of fitness tests, beliefs of the importance of fitness tests, and beliefs of the usefulness of fitness tests). Negative items were reverse-coded so that a higher score reflected a more positive attitude. The overall attitude was measured as the average of 16 items from the affective and cognitive components (Table 2). The affective component of attitude measured as the average of six items in the affective component (i.e., enjoyment of fitness tests, e.g., "I like fitness tests"). The cognitive component measured as the average of 10 items in the cognitive subdomains (i.e., belief in the importance of fitness tests, e.g., "I believe

Table 2
Scale Domains and Items

Domain	Subdomain	Items
Affective component	Enjoyment of fitness tests	Fitness tests are boring.
		I dislike fitness tests.
		Fitness tests are interesting.
		My experiences associated with fitness tests have been enjoyable.
		Fitness tests are fun.
		I like fitness tests.
Cognitive component	Belief in the importance of fitness tests	Time spent on fitness tests is well worth it.
		Fitness tests are an important component of physical education.
		Fitness tests should be highly stressed in schools.
		Fitness tests are a waste of time.
	Belief in the usefulness of fitness testing results	The results of fitness tests help students understand their health-related fitness status.
		The results of fitness tests help teachers develop better lesson plans for their future physical activity/fitness instruction.
		The results of fitness tests motivate students to participate in physical activity on a regular basis.
		The results of fitness tests can help teachers effectively evaluate students' health-related physical fitness.
		The results of fitness tests can be used to assess the effect of a teacher's physical activity/fitness instruction.
		The results of fitness tests inaccurately reflect what students learned in physical activity/fitness instruction.

that fitness tests are important," and belief in the usefulness of fitness testing results, e.g., "fitness test results are useful"). Refer to Keating et al. (2001) for the items in each component. Additional measures collected and analyzed included teacher characteristics (i.e., gender, ethnicity, previous experience with fitness tests, year in university, and professional membership). The percentage of each category was calculated. A multivariate analysis of variance (MANOVA) examined the effect of teacher characteristics in the three attitude subdomains, and an analysis of variance (ANOVA) investigated differences in overall attitudes by these teacher characteristics. Follow-up tests for significant differences identified which categories contributed to the differences.

Results

Overall Attitudes and Differences in Gender, Ethnicity, Year in University, Previous Experience With Fitness Tests, and Professional Membership

Overall, PPETs had a very slightly positive attitude score ($M = 4.23$, $SD = 1.08$; score ranges from 1.06 to 6.63), where a point of 4 indicated neutral attitudes in the 7-point Likert scale with 1 representing *strongly disagree* and 7 representing *strongly agree*. This result is in line with that reported by Keating et al. in 2002. A one-way ANOVA briefly examined group differences of PPETs' overall attitudes by gender, ethnicity, year in university, previous experience with fitness tests, and professional membership (Table 3). In general, previous experiences with fitness tests had significant effect on PPETs' overall attitudes, $F(6, 149) = 9.879$, $p < .001$. The post hoc test presented that PPETs who had very enjoyable experiences with fitness tests had the highest attitude score among all the other groups, and the difference was significant ($p < .001$). Moreover, PPETs who had somewhat unenjoyable experiences with fitness tests had the lowest score, and the difference was significant ($p < .01$). Those with a neutral experience had significantly lower attitude scores than those with at least a somewhat enjoyable experience ($p < .05$). Gender, ethnicity, year in university, and professional membership had no significant impact. The five-way ANOVA reported no interaction effect on PPETs' overall attitudes.

Table 3
Overall Attitudes by Groups

Variable	Overall Attitude *M* (*SD*)
Total	4.23 (1.08)
Gender	
Male	4.15 (1.17)
Female	4.31 (1.02)
Ethnicity	
White	4.20 (1.10)
Black	4.43 (0.78)
Asian/Pacific Islander	5.44 (0.22)
Hispanic/Latino	4.56 (1.47)
American Indian/Alaskan Native	5.94 (0.00)
Two or more races	3.80 (0.93)
Other	3.88 (0.72)
Year in university	
Freshman	4.27 (1.37)
Sophomore	4.28 (0.97)
Junior	4.51 (0.98)
Senior	4.12 (1.34)
Other	3.87 (1.17)
Previous experience with fitness tests	
Very unenjoyable	4.21 (1.60)
Unenjoyable	4.24 (1.21)
Somewhat unenjoyable	3.30 (0.78)**
Neither enjoyable nor unenjoyable	3.83 (0.78)*
Somewhat enjoyable	4.55 (0.76)
Enjoyable	4.79 (0.70)
Very enjoyable	5.49 (0.78)***
Professional membership	
Yes	4.12 (1.05)
None	4.41 (1.13)

*** $p < .001$. ** $p < .01$. * $p < .05$.

Three Subdomains of Attitude and Differences in Gender, Ethnicity, Year in University, Previous Experience With Fitness Tests, and Professional Membership

Table 4 shows the means and standard deviations of the three attitude subdomains. A one-way MANOVA briefly examined differences on three attitude subdomains by gender, ethnicity, year in university, previous experience with fitness tests, and professional membership, respectively. Then a five-way MANOVA examined for any interaction effect.

Previous experience with fitness tests had a significant effect, Wilks' $\Lambda = 0.670$, $F(6, 149) = 3.374$, $p < .001$. The post hoc test indicated differences in the enjoyment of fitness tests, $F(6, 149) = 8.515$, $p < .001$; belief in the importance of fitness tests, $F(6, 149) = 6.903$, $p < .001$; and belief in the usefulness of the fitness testing results, $F(6, 149) = 7.059$, $p < .001$.

As for the enjoyment of fitness tests, PPETs who had a very unenjoyable experience with fitness tests had significantly lower scores than those who had very enjoyable experiences ($p < .05$). Those with unenjoyable experiences had significantly lower scores than those with very enjoyable experiences ($p < .05$). PPETs with somewhat unenjoyable experiences had significantly lower scores than those with at least somewhat enjoyable experiences ($p < .01$). Those with neutral experiences had significantly lower scores than those with enjoyable and very enjoyable experiences ($p < .01$).

Regarding the beliefs of the importance of fitness tests, PPETs with unenjoyable experiences had significantly lower scores than those who had very enjoyable experiences ($p < .05$). Those with somewhat unenjoyable experiences had significantly lower scores than those with at least somewhat enjoyable experiences ($p < .01$). Those with neutral experiences had significantly lower scores than those with enjoyable and very enjoyable experiences ($p < .05$).

In terms of the beliefs of the usefulness of fitness testing results, PPETs with very unenjoyable experiences had significantly lower scores than those with very enjoyable experiences ($p < .05$). Those with somewhat unenjoyable experiences had significantly lower scores than those with at least somewhat enjoyable experiences ($p < .001$). Those with neutral experiences had significantly lower scores than those with at least somewhat enjoyable experiences

Table 4
Three Attitude Subdomains by Groups

	Affective-enjoyment	Cognitive	
		Importance	Usefulness
Variable	***M* (*SD*)**	***M* (*SD*)**	***M* (*SD*)**
Gender			
Male	4.12 (1.23)	4.47 (1.17)	4.38 (1.05)
Female	4.11 (1.36)	4.24 (1.41)	4.13 (1.14)
Ethnicity			
White	4.03 (1.29)	4.34 (1.29)	4.27 (1.12)
Black	4.50 (0.86)	4.61 (1.24)	4.24 (0.58)
Asian/Pacific Islander	5.61(0.95)	5.67 (0.52)	5.11 (0.10)
Hispanic/Latino	4.72 (1.98)	4.33 (1.43)	4.56 (1.26)
American Indian/Alaskan Native	5.00 (0.00)	6.50 (0.00)	6.50 (0.00)
Two or more races	3.92 (0.75)	4.00 (1.02)	3.54 (1.21)
Other	3.92 (1.03)	4.00 (1.13)	3.75 (0.52)
Year in university			
Freshman	3.89 (1.53)	4.38 (1.52)	4.58 (1.28)
Sophomore	4.07 (1.18)	4.37 (1.08)	4.43 (1.13)
Junior	4.41 (1.21)	4.67 (1.22)	4.49 (0.92)
Senior	4.07 (1.35)	4.32 (1.40)	4.03 (1.00)
Other	4.11 (1.28)	3.95 (1.34)	3.84 (1.21)
Previous experience with fitness tests			
Very unenjoyable	4.10 (2.06)*	4.47 (1.72)	4.14 (1.24)*
Unenjoyable	4.14 (1.50)*	4.22 (1.32)*	4.36 (1.15)
Somewhat unenjoyable	3.07 (0.91)**	3.38 (0.94)**	3.47 (0.89)***
Neither enjoyable nor unenjoyable	3.65 (0.81)**	4.01 (1.16)*	3.88 (0.92)*
Somewhat enjoyable	4.36 (0.92)	4.64 (0.98)	4.69 (1.01)
Enjoyable	4.81 (0.84)	4.95 (0.92)	4.65 (0.79)
Very enjoyable	5.48 (0.83)	5.68 (1.06)	5.36 (0.96)
Professional membership			
Yes	4.10 (1.23)	4.18 (1.25)*	4.09 (1.06)*
None	4.14 (1.36)	4.64 (1.29)	4.53 (1.09)

*** $p < .001$.** $p < .01$. * $p < .05$.

($p < .05$). Overall, PPETs with at least somewhat enjoyable experiences tended to have higher scores than those with neutral or at least somewhat unenjoyable experiences on all three attitude subdomains.

Professional membership also had a significant main effect, Wilks' $\Lambda = 0.927$, $F(1, 149) = 3.822$, $p = .011$. The univariate test indicated differences in beliefs of the importance of fitness tests, $F(1, 149) = 4.654$, $p = .033$, and beliefs of the usefulness of fitness testing results, $F(1, 149) = 5.945$, $p = .016$. It indicated that PPETs who joined professional associations had significantly lower scores in the beliefs of the importance of fitness tests as well as the beliefs of the usefulness of fitness testing results. No significant effect of professional membership on enjoyment of fitness tests was found.

The results of the one-way MANOVA with gender as the independent variable suggested that gender had no significant effect on all three attitude subdomains. A similar result was found for ethnicity and year in university. The five-way MANOVA presented no interaction effect on all three attitude subdomains.

Discussion

In spite of fitness testing exploding in interest since the early 1950s (Harris & Cale, 2006; Keating et al., 2018; Morrow et al., 2009; Zhu & Yan, 2017), research on PPETs' attitudes toward fitness testing is still understudied (Keating, Liu, et al., 2020). The lack of understanding in this area may hinder endeavors of improving PETE programs and, subsequently, K–12 fitness education and students' HRF through fitness testing. More importantly, the need for youth fitness testing has been debated for years, stemming mostly around the usefulness of fitness testing in fitness education (Cale & Harris, 2009; Harris & Cale, 2007; Mischo et al., 2015). Doubts on the necessity of such educational practice might be mostly from the limited increase, if any, of students' fitness levels after years of fitness testing in schools, given no data are available to help us understand how fitness education has been done in schools. On the other hand, if used appropriately, fitness testing has great potential to enhance student HRF (Keating & Silverman, 2004; Silverman et al., 2008). Research has suggested that appropriate fitness testing should be connected to fitness education (Cohen et al., 2015; Corbin et al., 2014; Morrow et al., 2009) and the testing results should be used by teachers to help their students improve their fitness (Corbin, 2009; Keating &

Silverman, 2004; Silverman et al., 2008). However, without accurate data concerning student fitness, fitness education may be directionless (Morrow, 2005). As such, more research on the topic is needed for schools to offer effective fitness instruction through the use of reliable and valid fitness testing data. Without the implementation of sound fitness education, any fitness testing is meaningless. As such, research on the topic must consider the fitness education programs.

Although attitude is not directly related to behavior, research has shown attitudes as one main factor that influences behavior (Mercier et al., 2016; Silverman, 2017). It is unfortunate that there are few research studies concerning PPETs' attitudes toward youth fitness testing, even though fitness tests have been implemented in schools on a regular basis in many countries for many decades (Castro-Piñero et al., 2010; Keating et al., 2018). Nevertheless, in our study, PPETs' attitudes were slightly positive, providing a glimpse into 21st-century PPETs' attitudes. This finding parallels that for Chinese PPET counterparts (Keating, Liu, et al., 2020) and sheds positive light into the possible improvement in fitness testing in K–12 schools.

Understanding what factors may influence PPETs' attitudes toward fitness testing can be extremely valuable. For example, the unalignment between fitness education, the testing practice, and the noneducational use of testing results may have contributed to the almost indifferent attitudes toward fitness testing in this study. Moreover, to the best of our knowledge, no studies have examined if PPETs are well prepared to implement fitness tests, even though there has been more than a half of century of fitness testing in schools (Keating, 2003; Keating et al., 2018; Morrow et al., 2009). The findings from the study might impact instructional strategies and PETE programming. Instead of just using 1 week to address issues concerning fitness education and its testing in some methods courses, physical educators may purposefully create a unit to thoroughly discuss fitness education in K–12 programs. More importantly, field experiences related to fitness education and testing could also be embedded in PETE programs. Project-based learning assignments should also include fitness education and testing. Teacher educators can integrate more explicit instruction in methods or assessment courses to influence the perspective of positive attitudes toward fitness testing. It may also inform field experiences in that PPETs are

provided opportunities to incorporate fitness testing in their clinical settings as interns, as well as in their student teaching practicum.

It is disheartening that PPETs' attitudes toward fitness testing remained almost unchanged since the first study 18 years ago. Because these attitudes appear to be shaped prior to participation in PETE programs, research needs to address PPETs' previous experiences with fitness testing within the professional training the PETE programs offer in fitness programming and testing. The reason is that PETE programs can reshape PPETs' attitudes, but it would also be good to find what influences these attitudes the most (e.g., prior fitness testing experiences).

It is important to note that during the year of 2017, the formerly American Alliance for Health, Physical Education, Recreation, and Dance, now SHAPE America, issued its position statement titled as the *Instructional Framework for Fitness Education* (SHAPE America, 2012), which suggested the use of Fitnessgram as a critical component of fitness education. Unfortunately, to the best of our knowledge, it remains unanswered how in-service teachers have used the framework. Moreover, the nonsignificant main effect of year in university also supported the contention that small changes in attitudes toward fitness testing were observed among PPETs as their years of training increased in PETE programs. It is puzzling why PPETs' attitudes toward fitness testing still remain the same. However, one plausible reason may be related to the implementation of fitness testing in schools and the use of the results (Keating & Silverman, 2009).

Researchers have found that mindsets play a large role in openness to learn (Dweck, 2008) and attitudes in behavior change (Ajzen et al., 1989). Therefore, information concerning PPETs' slightly positive attitudes toward fitness testing in two large countries (i.e., United States and China) would help improve fitness testing practice in K–12 programs globally. The significant attitudinal differences in previous fitness testing experience in K–12 programs are worth noting. As might be expected, positive previous fitness testing experience is likely associated with PPETs' attitudes toward fitness testing. Thus, it is critical to ensure that PPETs have positive fitness testing experience in K–12 programs so that their attitudes toward fitness testing are more positive. On the other hand, however, it is also important to pay special attention to those PPETs with negative

fitness testing experiences and make efforts to improve their attitudes toward fitness testing so that it is more likely that they will effectively implement fitness tests in their schools in the future. Of more importance, future research on the topic should focus on what can be done to change how fitness testing is being implemented to help change the negative attitudes toward fitness testing among PPETs who will in turn influence the profession at all levels in society (i.e., family, schools, communities, and states).

Limitations

Two limitations should be noted. First, the sample size is relatively small. Cautions need to be exercised when generalizing the results of the study to its population. Second, this is a survey study using a Likert scale. Therefore, only the trend of the PPETs' attitudes could be assessed.

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